Statement for the Record

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Before the U.S. House of Representatives

Committee on Homeland Security

Subcommittee on Transportation Security and Infrastructure Protection

March 17, 2010

INTRODUCTION

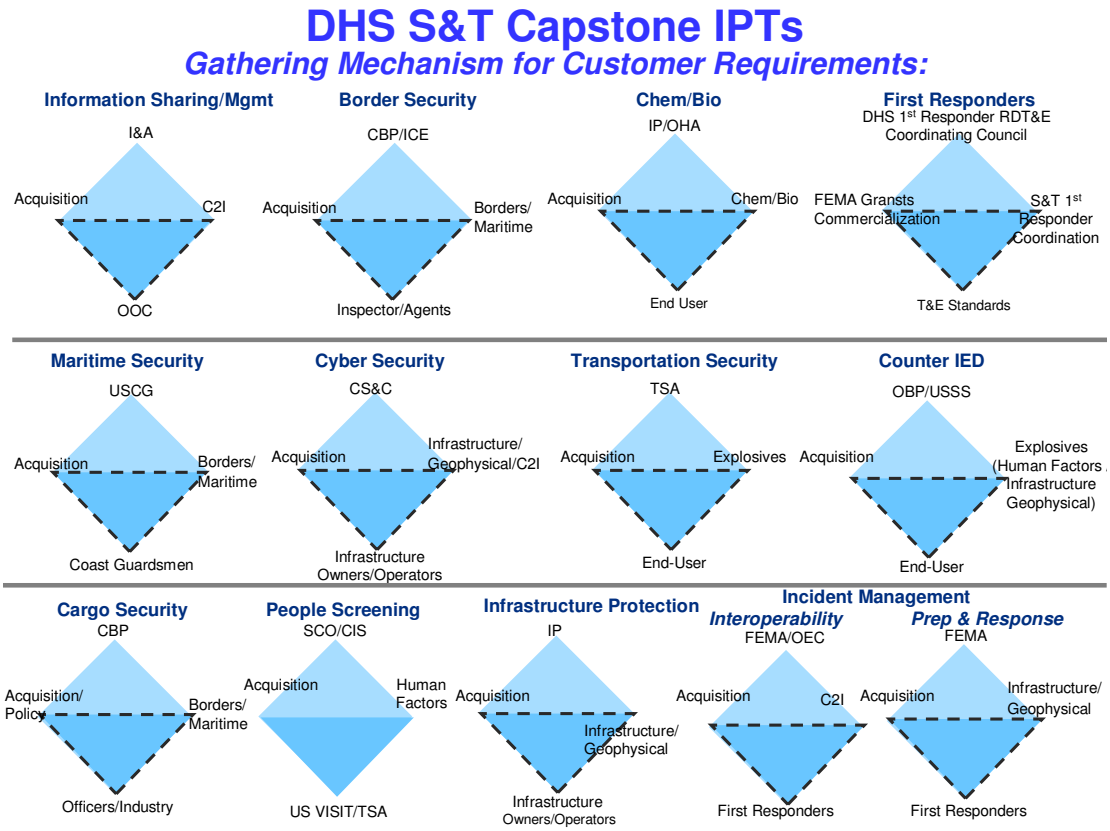
Good afternoon, Chairwoman Jackson-Lee, Congressman Dent, and distinguished Members of the Subcommittee. I am honored to appear before you today on behalf of the Department of Homeland Security (DHS) to report on the Science and Technology Directorate's (S&T) research, development, test and evaluation (RDT&E) efforts relating to airport passenger screening technology.

Passenger Screening Capability Development

S&T has a variety of roles in the Department. S&T provides technical support and tools to the major DHS operating components and the Nation's first responders; funds basic research and technology development; and supports the Department's major acquisitions through testing, evaluation, and the development of standards.

The Transportation Security Administration (TSA) protects the Nation's transportation systems to ensure freedom of movement for people and commerce. While TSA has the lead role in defining the performance of airport security equipment, S&T and TSA coordinate closely on research efforts and equipment test and evaluation to advance capabilities that best protect the traveling public. These efforts have yielded numerous technical improvements that enhance the effectiveness of screening techniques and technologies while moving increasing numbers of people more quickly through security.

The Department's research and development priorities are primarily customer-driven through our Capstone Integrated Product Team (IPT) process. DHS customers—such as TSA—chair the Capstone IPTs and establish their desired capability priorities based on their assessment of risk in their respective mission areas. Three IPTs — Transportation Security, Counter Improvised Explosive Devices (C-IED), and People Screening— are dedicated to identifying and delivering technological solutions for detecting and countering threats to the safety and security of the traveling public. Our Transportation Security IPT, led by TSA with support from S&T's Explosives Division, strives to identify and deliver technologies to improve our layered approach to aviation security. TSA is also an integral member of the People Screening IPT, providing valuable input as a user of proposed screening technologies. Finally, the Counter-IED IPT works to identify and develop trace detection and standoff imaging technologies that will impact the next generation of checkpoint technologies.



All three DHS S&T portfolios — Product Transition, Innovation/Homeland Security Advanced Research Projects Agency (HSARPA), and Basic Research — participate in the IPT process. While the IPT members drive the selection of Product Transition projects, the expressed needs that arise from this process also inform the selection of projects in our Basic Research portfolio and similarly inform the higher-risk/high pay-off initiatives undertaken by our Innovation/HSARPA portfolio. The more insight we gain regarding current and future threats and the capability gaps of our stakeholders, the better positioned we are to identify promising areas of research and explore innovative solutions that are outside the development timeframe for the nearer term-focused Product Transition portfolio.

In addition to the Capstone IPT process, we have recently established the DHS–Department of Energy (DOE) Aviation Security Enhancement Partnership to advance technical solutions to key aviation security problems in support of priorities announced by the President following the failed December 25 bombing attempt. While DHS has always worked in close collaboration with the DOE National Laboratories, this new partnership allows an unprecedented level of access between the research community and operators that conduct aviation security efforts in DOE, DHS, and TSA. We have now agreed to create a senior-level (at the Under Secretary level) governance mechanism to manage ways to extend and leverage this relationship with a focus on improving aviation security by:

- Delivering key advanced aviation security technologies and knowledge;

- Conducting analyses to assess possible vulnerabilities and threats and support/inform technology requirements, policy, planning, decision-making activities; and
- Reviewing the use of existing aviation security technologies and screening procedures, and the impact of new or improved technologies using a systems analysis approach to illuminate gaps, opportunities and cost effective investments.

Research and Development Priorities

There is no single technological solution to aviation security. A layered security approach to passenger screening features multiple passenger and baggage screening tools and integrates human factors considerations, metal detectors, Advanced Imaging Technology (AIT) with X-rays and millimeter waves, trace explosives detection and canines. S&T's R&D Program is focused on improving the performance of currently deployed screening equipment and procedures in the near-term, and developing and deploying new technologies and procedures in the long-term. Future improvements aim to screen passengers and carry-on baggage for an increasing range of threats and streamline travel by easing certain restrictions, such as the need to remove shoes during screening or limits on carrying liquids onto the plane.

We develop technologies and techniques that maximize DHS and other end users' operational flexibility as well as ensure the privacy, civil rights and civil liberties of our citizens are protected. Our screening research programs are developed and executed in close cooperation with the DHS Chief Privacy Officer as well as the Office of Civil Rights and Civil Liberties to ensure that we consciously consider and address their impacts or risk to the public. S&T conducts in-depth analyses of such efforts through ongoing dialogue with the DHS Privacy Office and the DHS Office of Civil Rights and Civil Liberties and related documentation such as Privacy Impact Assessments or Civil Liberties Impact Assessments.

We continuously evaluate and improve the capabilities of currently deployed technologies against new threats and seek to develop state-of-the-art threat detection technology for TSA passenger checkpoints to screen out evolving threats while improving the passenger experience with higher throughput and minimal restrictions. The highest-priority effort in this area is improving detection software algorithms, including effective automatic target recognition, in our currently deployed imaging systems, particularly AIT and Advanced Technology (AT) X-ray screening devices. AIT is one of the most promising technologies for detecting non-metallic weapons and small quantities of explosives concealed on individuals. AT X-ray provides an enhanced detection capability with multi-dimensional visual screening and improved image resolution of carry-on bags. Both of these technologies would greatly benefit from algorithm improvement and other systems research and engineering approaches that consider human factors to optimize security officer performance in threat detection and identification.

Efforts dedicated to suspicious behavior detection could also provide near-term benefit in passenger screening. The Suspicious Behavior Detection Program strives to improve screening by providing a science-based capability to identify unknown threats indicated by deceptive and suspicious behavior. This program addresses operational needs for real-time, non-invasive detection of deception or hostile intent that are applicable across the DHS mission.
In the longer term, a continuing, robust RDT&E program across the three S&T portfolios is necessary.

The Explosives Research Program funds multidisciplinary basic research in imaging, particle physics, chemistry, material science and advanced algorithm development to develop enhanced explosive detection and mitigation capabilities.

The transition program, guided by the Capstone IPT process, is comprehensive and encompasses:

- Automated imaging systems to screen for weapons, conventional explosives, and home-made explosives (HME) in carry-on bags;
- Trace explosives detection capabilities for identifying explosives on people and in carry-on baggage;
- A next generation fully automated checkpoint for detecting weapons and explosives on people for aviation, mass transit, public gathering venues, or other potentially high-risk buildings;
- Human performance research and technology development for increased security officer efficiency and effectiveness;
- A science-based capability to derive, validate, and automate detection of observable indicators of suicide bombers;
- A science-based capability to identify known threats and facilitate legitimate travel through accurate, timely, and easy-to-use tools for biometric identification and credential validation;
- Technologies and methods for identifying insider threats.

The innovation program, managed by HSARPA, is looking at "leap-ahead" technologies such as:

- Future Attribute Screening Technology (FAST) to determine if it is possible to detect malintent (the mental state of individuals intending to cause harm) by utilizing non-invasive physiological and behavioral sensor technology, deception theory, and observational techniques. Though we have established an initial scientific basis for the technology, this project is still in the early stages as we work on both the science and theory to support the concept.
- MagViz is looking at the possibility of using technology similar to hospital MRI machines to look for and identify liquids. The magnetic fields in MagViz are much lower

power than its medical counterparts, allowing operation without the restrictions and high costs of traditional MRI. We demonstrated this technology with a small scale prototype at the Sunport Airport in Albuquerque, NM, in December 2008. MagViz was successful at identifying a dangerous liquid in a small bottle among many non-hazardous liquids in a standard TSA checkpoint bowl. The project is still in the research phase, and we are now trying to prove the technology using a larger size container and a broader array of both non-hazardous and potentially hazardous liquids.

S&T Role in Test & Evaluation

Section 302 of the Homeland Security Act of 2002 charges S&T with the responsibility for "coordinating and integrating all research, development, demonstration, testing, and evaluation activities of the Department." To carry out these and other test and evaluation (T&E)-related legislative mandates, the Directorate established the Test and Evaluation and Standards Division (TSD) in 2006 and created the position of Director of Operational Test & Evaluation in 2008.

TSD develops and implements robust Department-wide T&E policies and procedures. Working with the DHS Under Secretary for Management, TSD approves Test and Evaluation Master Plans (TEMP) that describe the necessary Developmental Test and Evaluation (DT&E) and Operational Test and Evaluation (OT&E) tasks that must be conducted in order to determine system technical performance and operational effectiveness based upon vetted Operational Requirements Documents.

Many of the Department's airport security technologies begin testing at the Transportation Security Laboratory (TSL). Test and evaluations activities at the TSL encompass two independent functions and complies with the robust Department-wide T&E policies and procedures. First, the Independent Test and Evaluation (IT&E) function is responsible for evaluating mature technology that may meet TSA's security requirements and is suitable for piloting or deployment. Second, the research and development function has responsibilities ranging from applied research to prototype development to technology maturation that produces prototypes suitable for evaluation by the IT&E Team. I am joined today by the TSL Director, Susan Hallowell.

The IT&E group works closely with TSA's Office of Security and Technology to determine testing requirements, priorities, and results of evaluations. At TSL, IT&E activities, which include certification, qualification, and assessment testing, are generally performed to determine if detection systems meet TSA-defined requirements. Results help define key program milestones, benchmarking, and investment strategy as well as support decisions of DHS operating components (such as TSA) for field trials, production, or deployment. RDT&E activities are designed to verify that a prototype or near-commercial off-the-shelf system has met performance metrics established within the R&D program such that it can proceed to the next R&D stage.

The Certification Test Program is reserved for detection testing of bulk and trace explosives detection systems (EDS) and equipment under statutory authority 49 U.S.C. §44913 for checked

baggage. Before mature EDS are deployed, it must be certified that salient performance characteristics are met.

Qualification Tests are designed to verify that a security system meets requirements as specified in a TSA-initiated Technical Requirements Document. This test, along with piloting (field trials), generally results in a determination of fitness-for-use. This process is modeled after the certification process and is defined within the Qualification Management Plan. Unlike the Certification Test, the requirements of the Qualification Management Plan typically expand beyond detection functions to include operational requirements. The result of Qualification Testing is a recommendation of whether candidate systems should be placed on a Qualified Products List.

Laboratory Assessment Testing is conducted to determine the general capability of a system. These evaluations of candidate security systems are carried out in accordance with interim performance metrics, and the results drive future development efforts or operational deployment evaluations. While the IT&E group practices best scientific principles in test design, execution, and evaluation of data, assessment criteria are determined by the DHS component's needs.

Developmental Test and Evaluation is performed by the R&D team at the TSL and involves testing in a controlled environment to ensure that all system or product components meet technical specifications. These tests are designed to ensure that developmental products have met major milestones identified within the R&D project and DT&E testing at the TSL assesses the strengths, weaknesses, and vulnerabilities of technologies as they mature and gain capability. The primary focus is to ensure that the technology is robust and ready for Certification or Qualification tests.

Following completion of the IT&E, an Operational Test Readiness is conducted to determine whether the certified or qualified systems are ready for operational testing. OT&E for systems occurs in several airports, by trained TSA operators using test plans that are approved by S&T's Director of Operational T&E. Testing in an operationally accurate environment identifies issues in system operations before deployment is contemplated.

TSD currently provides oversight to major acquisition programs, including TSA programs, by: participating in T&E working groups; approving TEMPs, and Operational Test Plans; participating in Operational Test Readiness Reviews; observing testing; and participating in Acquisition Review Boards.

Public and Private Sector Engagement

To maximize the effectiveness of our resources and leverage the scientific work being done in both the public and private sectors, we have made concerted efforts to form partnerships throughout the government and across the academic, business, and international communities. In addition to the DHS-DOE Aviation Security Enhancement Partnership, we are also utilizing our intra-government partnership with Department of Defense (DOD) in the form of the Capability Development Working Group (CDWG). Co-chaired by the DHS Under Secretaries for S&T and Management, as well as the Under Secretary of Defense for Acquisition,

Technology and Logistics, the CDWG will ensure that investments in explosive detection made by DOD are considered as we pursue capabilities to keep the traveling public safe.
Academia is a critical partner in long-term research and the development of the science and technology workforce that America will need to maintain its security. Our university-based Centers of Excellence (COE) are conducting or have finished approximately 500 research projects. Efforts relevant to transportation security are underway at our explosives research COE at Northeastern University, our BORDERS COE at the University of Arizona, and, of course the seven-institution National Transportation Security COE. These COEs are leading long-term efforts, such as developing advanced technologies for detecting a variety of explosive precursors and mixtures; conducting scientific research related to next-generation screening techniques; and research to give us fundamental understanding of other counter-explosive technologies.

The failed December 25 bombing attempt made it clear that terrorism respects no borders. Similarly, S&T continues to look to the international community for technologies and techniques critical to bolstering aviation security. I am personally engaged with the ten countries with which we have formal bilateral S&T agreements—Australia, Canada, France, Germany, Great Britain, Israel, Mexico, New Zealand, Singapore, and Sweden—to ensure that we have identified the most promising aviation security technologies and techniques around the globe.

Finally, in order to leverage the innovation that resides outside the Federal Government, we have a standing Broad Agency Announcement (BAA 09-05) that provides a means for the private sector to submit its technological ideas for consideration across the broad range of mission areas that we support, including aviation security.

Conclusion

Thank you for your dedicated efforts to improve the safety of air travel for all Americans. I appreciate the opportunity to meet with you today to discuss research initiatives to strengthen passenger screening. I look forward to answering your questions.